Proposed 2005 Vermont Guidelines for Energy Efficiency Commercial Construction
(IECC 2004 with VT amendments)

June 10, 2005

Agenda

- Introduction
- Overview of New Guidelines
- Lunch
- Question and Answer

Introduction

- History of Commercial Building Energy Standards (CBES) Working Group
  - 2001 Vermont Guidelines for Energy Efficient Commercial Construction
    - International Energy Conservation Code 2000 &
    - ASHRAE/IESNA Standard 90.1-1999 Energy Standard for Buildings Except Low-Rise Residential Buildings

CBES Working Group

- Both IECC and ASHRAE/IESNA updated to reflect advances in technology
- Appropriate for Vermont to adopt new standards to stay current with national trends
- Updates to *COMcheck-EZ* and 10,000 sq ft or less building guidelines to follow
- Comments requested by July 15, 2005
- Tentative September 1, 2005 publication date
- Phase in first quarter 2006
- Coordinate with Legislature W/R/T S.52

Application

- Act 250
- VT State Buildings
- School Buildings
- City of Burlington
- Minimum performance standard for EVT and VGS programs
- Platform for future statewide commercial building energy standards

Overview of New Guidelines

- 2004 International Energy Conservation Code (IECC) as base document
- Includes alternate compliance path of ASHRAE/IESNA 90.1-2004

  (now referenced in Chapter 8)

  with Vermont-specific amendments

Benefits of New Guidelines

- Simplicity
- Energy benefits
- Vermont-specific amendments
- BED could adopt the same as code in Burlington

Overview of New Guidelines

- Format of Guidelines
  - Published by the International Code Council (ICC) with Vermont-specific amendments
  - Copies will be available from:
    - ICC
    - DPS
    - BED
    - VGS
    - EVT

IECC Format

- Chapter 1: Administration & Enforcement
- Chapter 2: Definitions
- Chapter 3: Climate Zones
- Chapter 4 & 5 & 6: Residential Buildings – Reserved (Not Applicable)
- Chapter 7: Reserved (Not Applicable)
- Chapter 8: Building Design for Commercial Buildings
- Chapter 9: Reserved (Not Applicable)
- Chapter 10: Referenced Standards

Unchanged

- Scope and General Requirements
  - Applicability
  - Exemptions
  - Definitions

Highlighted Changes Since 2001 Guideline

- Approval and Acceptance Requirements greatly simplified (Chapter 1)

Chapter 8

- General (Section 801)
- Building Envelope (Section 802)
- Building Mechanical Systems (Section 803)
- Service Water Heating (Section 804)
- Electrical Power and Lighting Systems (Section 805)
- Other Equipment (Section 806)

General - Section 801

- References ASHRAE/IESNA 90.1-2004
  - Changes
    - Envelope – requires same Section 802 Tables
    - Transformers – dry type and liquid-filled, requires same as Section 806
    - ESH prohibited with limited restrictions – same as Section 803
    - Electric DHW Heat limitation – same as Section 804

Envelope - Section 802

- One Envelope table for up to 40% fenestration – Table 802.2.(1)
  - Roof above, below grade walls, slab on grade, doors, fenestration, metal buildings and skylights
  - Table 802.2(1) also used for ASHRAE/IESNA 90.1-2004 compliance
  - Previously 4 tables
    - < 10%
    - > 10 to = 25%
    - > 25 to = 40%
    - > 40 to = 50%

Envelope - Section 802

- > 40% fenestration use ASHRAE/IESNA 90.1-2004 Energy Cost Budget Method
  - Previously > 50% use ASHRAE/IESNA 90.1-1999 Energy Cost Budget Method

Envelope – Section 802

Table 802.2(1)

Roof	
Insulation entirely above deck	R-24 ci (R-19 to 24 chi)
Metal buildings (with R-5 thermal blocks)	R-30 or R-19 + R10 (R-30)
Attic and other	R-38 (same)
Walls, Above grade	
Mass	R-9.5 ci (R-5 chi)
Metal building	R-13 + R-13 (R-19)
Metal framed	R-13 + R-7.5 ci (R-11 to R-19 + R-3 chi)
Wood framed and other	R-19 or R-7.5 ci or R-13 + R-3.8 chi (R--11 to R-19 +R-3 CI; R-5 chi)
Walls, Below grade	
Below grade wall	R-10 chi (same)

Envelope – Section 802

Table 802.2(1) (continued)

Floors	
Mass	R-10 ci (same)
Joist/Framing	R-30 (same)
Slab on grade floors	
Unheated Slabs	R-10 for 48 inches (same)
Heated Slabs	R-10 for entire slab (under slab and perimeter) (same)
Opaque Doors	
Swinging	U-0.50
Roll-up or sliding	R-10

Envelope – Section 802

Table 802.2(2)

Vertical Fenestration (40% maximum of gross above-grade wall)	
SHGC – All Frame Types	
SHGC: PF < 0.25	0.40 (0.32 to 0.46)
SHGC: 0.25 < PF < 0.50	0.55 (0.48 to 0.55)
SHGC: PF = 0.5	NR (0.64)
U-Factor	
Framing Materials other than Metal with or without Metal Reinforcement of cladding	
U-Factor	0.35 (0.48 to 0.47)
Metal framing with or with out Thermal Break	
Curtain Wall/Storefront U-Factor	0.45 (0.48 to 0.47)
Entrance Door U-Factor	0.80 (0.48 to 0.47)
All other U-Factor	0.50 (0.48 to 0.47)

Envelope – Section 802

Table 802.2(2) (continued)

Skylights (3% maximum of the gross roof area)	
Glass	
U-Factor	0.60 (same)
SHGC	0.40 (0.49 to 0.68)
Plastic	
U-Factor	0.60 (same)
SHGC	0.62 (0.71)

Mechanical – Section 803

- Electric Space Heat
  - Prohibited with limited exceptions
- Air Conditioning
  - Requirements match federal standards

Service Water Heating – Section 804

- Requirements will match federal standards

- Electric DHW Heat
  - Restricted to maximum 5 kW total input

Electrical Power and Lighting Systems – Section 805

- Interior Power Densities

Interior Power Allowances

Building Area Type	**W/ft^2**
Automotive facility	0.9
Convention center	1.2 **(1.5 tenant area method)**
Courthouse	1.2
Dining: bar lounge/leisure	1.3 **(1.4 tenant area)**
Dining: cafeteria/fast food	1.4 **(1.7)**
Dining: family	1.6 **(1.7)**
Dormitory	1.0
Exercise center	1.0 **(1.4)**
Gymnasium	1.1 **(1.9 tenant area)**
Healthcare clinic	1.0 **(1.6)**
Hospital	1.2 **(1.6)**
Hotel	1.0 **(2.4 tenant area)**
Library	1.3 **(1.5)**
Manufacturing Facility	1.3 **(2.1 to 3.0)**
Motel	1.0
Motion picture theater	1.2

Interior Power Allowances (continued)

Building Area Type	W/ft^2
Multifamily	0.7
Museum	1.1 **(1.6)**
Office	1.0 **(1.3)**
Parking garage	0.3
Penitentiary	1.0
Performing arts theater	1.6 **(1.4)**
Police/fire station	1.0
Post office	1.1
Religious building	1.3 **(2.2)**
Retail	1.5 **(1.9)**
School/university	1.2 **(1.5)**
Sports arena	1.1
Town Hall	1.1
Transportation	1.0
Warehouse	0.8 **(1.0 tenant area)**
Workshop	1.4

Exterior Power Allowances

Tradable Surfaces – Lighting power densities for uncovered parking areas; building grounds; building entrances and exits; canopies and overhangs' and outdoor sales areas may be traded	
APPLICATION	**LIGHTING POWER DENSITIES**
Uncovered Parking Area	
Parking lots and drives	0.15 W/ft2
Building grounds	
Walkways less than 10 feet wide	1.0 watts/linear foot
Walkways 10 feet or wider, plaza area and special features	0. W/ft2
Stairways	1.0 W/ft2
Building Entrances and Exits	
Main entries	30 watts/linear foot of door width
Other Doors	20 watts/linear foot of door width
Canopies and Overhangs	
Canopies (free standard, attached and over hangs)	1.25 W/ft2
Outdoor Sales	
Open areas (including vehicle sales lots)	0.5 W/ft2
Street frontage for vehicle sales lots in addition to "open area" allowance	20 watts/linear foot

Exterior Power Allowances (continued)

Non-Tradable Surfaces	
Building facades	025 W/ft2 for each illuminated wall or surface or 5.0 watts/linear foot for each illuminated wall or surface length
Automated Teller Machines and Night Depositories	270 watts per location plus 90 watts per additional ATM per location
Entrances and gatehouse inspection stations at Guarded facilities	1.25 W/ft2 of uncovered area (covered areas are included I the Canopies and Overhangs section of Tradable Surfaces)
Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft2 of uncovered area (covered areas are included I the Canopies and Overhangs section of Tradable Surfaces)
Drive-up windows at fast food restaurants	400 watts per drive-through
Parking near 24- hour retail entrances	800 watts per main entry

Other Equipment - Section 806

Motors

- No change in federal standards

Transformers

- Tracks NEMA Standard TP-1 2002
- Includes dry type and liquid-filled

Next Steps

- Comments requested by July 15, 2005
- Follow-up meeting by July 31, 2005
- Tentative September 1, 2005 publication date
- Phase in first quarter 2006
- Coordinate with Legislature W/R/T S.52

Comments by July 15, 2005

- Send to any of the following:
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